

ABSTRACT

Fixture Design in a Computer Integrated Manufacturing (CIM) Environment.

(May 1995)

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The lack of an adequate methodology that can be automated to perform the fixture design activities had created a void in the bridge linking CAD and CAM activities. This research addressed this concern by developing a methodology (for fixture design) that can be automated. The development of such a methodology supports the argument that there exists a means to automate the fixture design task. A functional IDEF0 model of the fixture design task was built after interacting with fixture design experts. This functional model was used as a basis for developing the three phased methodology. The developed methodology includes the preliminary design phase, the functional analysis phase and the validation phase. In the preliminary phase, the geometry and topology of the product are studied, features are identified and the given tolerances analyzed. The focus in the functional analysis phase (or Phase II) was to design the support, locator and clamping aspects of the fixture. Based on the output from Phase II (as well as the product design information, process sequence, etc.), the fixture design is validated in an automated manner in the last phase. Methods to automate the various activities in each of the three phases were developed in this research. A prototype fixture designer, TAMIL, was built to demonstrate the feasibility of the representations, algorithms and techniques developed in this research.